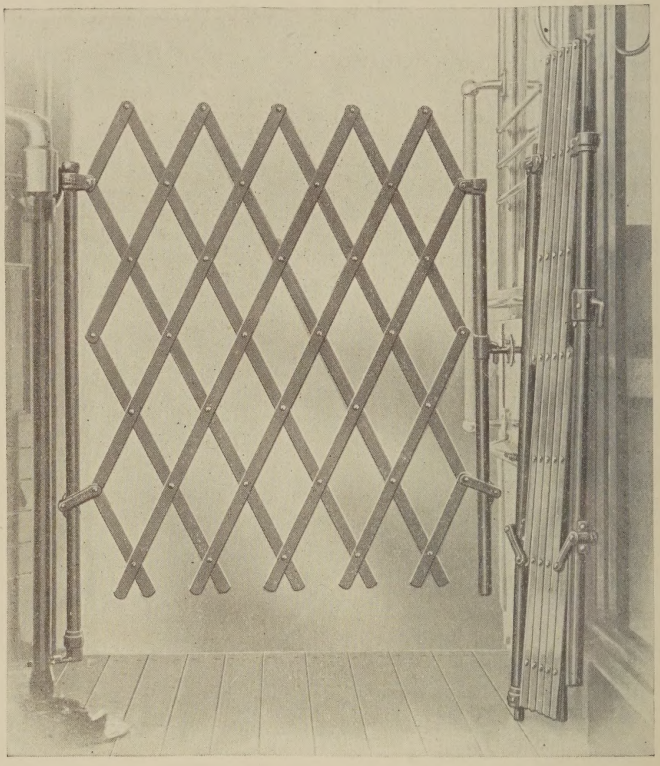
Vol. VII MAY, 1913 No. 5

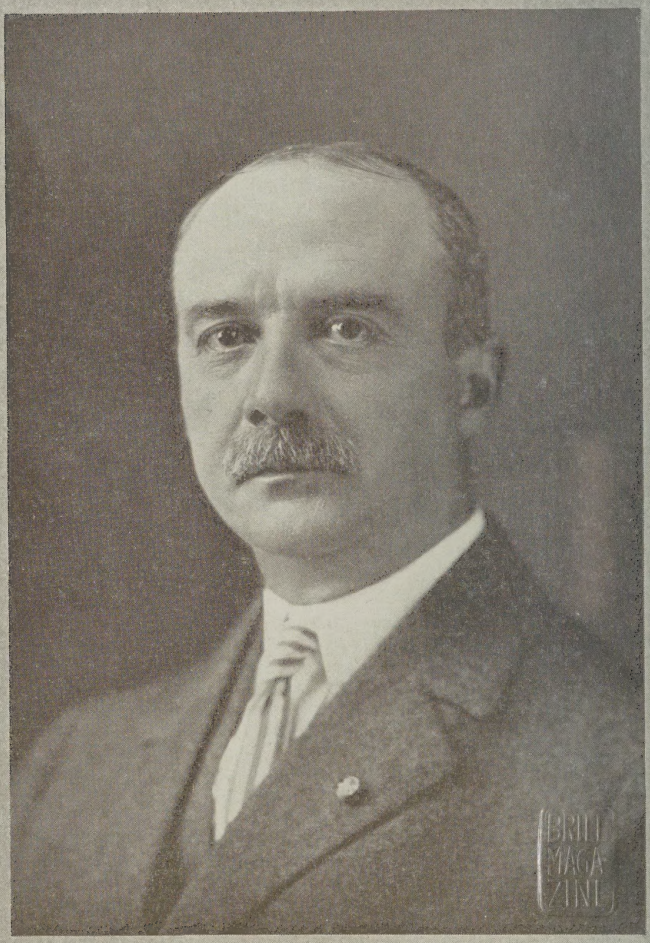
BRILL MAGAZINE

Broadway
Oakland, Cal.



THE BRILL FOLDING GATE

There's more to a folding gate than many people think; it's simple—nothing to it, it seems—we'll grant that. But if three or four people were thrown into the street by the gate's letting go on a curve, there'd be consequences—and heavy ones! It can't happen with this gate. It's made up of powerful bars or channels—as you prefer—it's flexible enough to absorb any bumps it may get. The picture tells the whole story—light, compact, fits any condition, easily applied, and strong, very strong. It's right, as you can see; another case of Brill, that's all.



W. R. Alberger

VICE-PRESIDENT AND GENERAL MANAGER
SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS

BRILL MAGAZINE

Vol. VII MAY, 1913 No. 5

W. R. ALBERGER

[WITH PORTRAIT INSERT]

WILLIAM R. ALBERGER, vice-president and general manager of the San Francisco-Oakland Terminal Railways and traffic manager of the Tonopah & Tidewater Railroad, was born at Buffalo, N. Y., October 4, 1860. After attending the local grammar schools, he devoted several years to commercial pursuits, whereupon, when he moved to Liberty, Mo., he was induced to take a special course at the William Jewell College, despite his lack of the usual high school training. In the early seventies he became yard weighmaster of the Hannibal & St. Joseph Railroad; later, division storekeeper and division superintendent's clerk. His longest service was with the Atchison, Topeka & Santa Fe Railway, where he was connected with every branch except the treasury department. In 1885 he went to California for the Santa Fe and was, successively, freight and passenger agent at San Jose, general agent of the Sante Fe Fruit & Refrigerator Line, chief clerk to the assistant traffic manager, foreign freight agent, and, finally, general agent at San Francisco. In 1906 he joined the railroad forces of F. M. Smith and soon rose to his present positions.

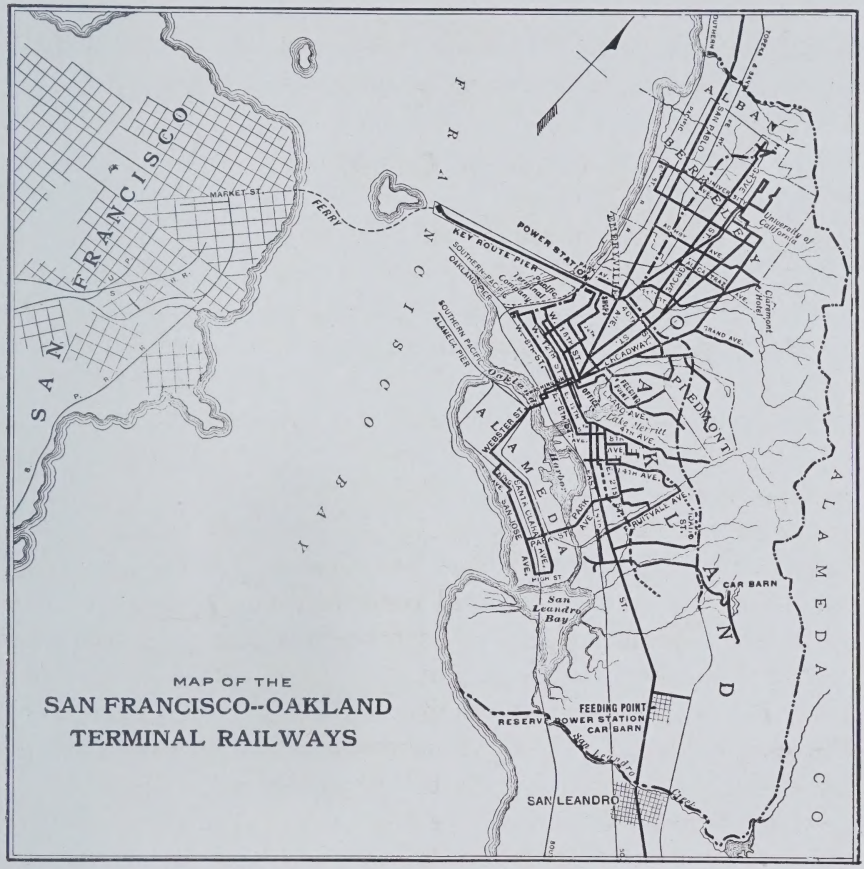
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

OAKLAND, CALIFORNIA*

OAKLAND presents an interesting and somewhat unusual traffic situation, due largely to its geographical position. It is slightly south of the midway point between the Canadian and Mexican boundaries and lies almost on a line with the easiest central mountain passes to the east. Then, as the largest of a group of cities—Berkeley on the north, Alameda toward the south, and several smaller communities in Contra Costa County, to which it is so closely related, except politically, that the result is practically one large city—it has become one of the most prominent western commercial and manufacturing centers. Their growth in population and importance has kept pace with that of San Francisco, which is but five miles away. San Francisco Bay separates the two cities, and Oakland's location on the east, or mainland, side, contrasted with San Francisco's, on a long peninsula between the bay and the Pacific Ocean, gave the former the advantage of an equally good water front and a much better natural tidewater terminal for transcontinental railroads. It was largely for these natural advantages that the old Central Pacific Railroad (now the Southern Pacific Company)—the original transcontinental road—built its line, in 1869, with Oakland as its western terminal.

Thereafter the city grew rapidly and steadily. The early "gold rush" brought sturdy settlers to California, and after the opening of the railroad, immigration continued unabated. During the last few years Oakland's population and importance have increased with extraordinary rapidity, till, with 150,174 inhabitants in 1910, it has become one of the large

* The fifty-third article of this series.



OAKLAND TRAFFIC CONDITIONS AND CARS. Albany, Berkeley and Alameda, with Oakland's business section as center, served by traction company. Key Route city lines included on map. Note length of pier in San Francisco Bay

western metropolises. The surrounding cities, which will be considered with Oakland in the discussion of the street railway situation, because of their thorough physical amalgamation with that city, add sufficient people to Oakland's population to give the entire district an aggregate of about 300,000.

From a manufacturing standpoint, the city ranks among the most active on the Pacific coast. During the last year the total output of its 1500 mills, factories and other establishments amounted to $48,000,000, and represented, mainly,

bread and cakes, dairy products, preserved fruit, prepared foods, confectionery, flour and grist milling, malt liquors, fireclay products, foundry and machine-shop products, copper, tin and sheet iron, carriages, wagons, automobiles, and railroad cars, tobacco, lumber and timber, and crude oil and its by-products. Its imports and exports are included in San

OAKLAND TRAFFIC CONDITIONS AND CARS. Intersection of Broadway, San Pablo Avenue and 14th Street is heaviest traffic point on system. During rush hours 250 cars pass each hour—one every 14⅖ seconds

Francisco's, which amounted to $62,700,000 and $55,800,000, respectively, in 1912.

Because San Francisco Bay is the only large natural harbor between Puget Sound and San Diego Bay, and Oakland is located on the mainland shore, all railroads running to that region have tidewater terminals there, and all San Francisco and oriental freight has to be trans-shipped at Oakland. The city has excellent rail connections with all parts of the United States, Canada and Mexico via the Southern Pacific

Company, the Western Pacific Railway and the Atchison, Topeka & Santa Fe Railway. In addition to the steam lines, the Southern Pacific Company operates a high-speed electric suburban service to most of the nearby towns, and another large interurban system, the "Key Route" which will be briefly touched upon in this article, maintains a comprehen-

OAKLAND TRAFFIC CONDITIONS AND CARS. View up Broadway from 12th Street is typical. It shows the wide, well-paved streets that prevent congestion during rush periods. Broadway is one of the chief traffic streets

sive service in connection with the Oakland street railway system, of which it is a part. Oakland is also the terminal for a large volume of transpacific traffic, having direct steamer lines to the Orient, the Malaysian Archipelago, Australia, Australasia and other parts of the world.

Reference to the map on page 131 gives a good general idea as to the relative positions of Albany, Berkeley, Oakland and Alameda, and how the location of each city, with respect to the others, forms a single, densely populated, metropolitan

OAKLAND TRAFFIC CONDITIONS AND CARS. Key Route local train at waiting-room runs to San Francisco Ferry pier through business section. This is also at Broadway and 12th. Key Route trains in rapid transit service on many city lines

area. While each city has its own business section, the real center of business activity is in the southwestern corner of Oakland, just north of Oakland harbor—a land-locked arm of San Francisco Bay, that creates the island upon which Alameda lies. The residential districts form almost an arc of a circle, with Oakland's business portion as a center, and extend from Albany, on the north, through the Oakland "back country" and Alameda to the southeastern part of Oakland.

In the business portion, the streets follow the rectangular plan to a greater or less degree, but, as in many other cities, the various districts do not maintain parallelism with respect to each other; while not strictly radial, the general tendency is in that direction. In other portions the streets apparently follow no definite plan, but assumed their routes because of the irregular surface and the penetration of Lake Merritt,

near the heart. Oakland and its neighbors have a well-planned park system, with Lake Merritt as the focal point.

The entire street railway system of the various cities forming the group, as well as the "Key Route," which is the big interurban division, and the ferries to San Francisco, are operated by the San Francisco-Oakland Terminal Railways. The city and interurban service are closely related, and, as they are now operated, each supplements the other, making a harmonious and comprehensive system. The interurban system, which will be fully described in a series of articles on Interurban Centers, in future issues of BRILL MAGAZINE, operates a 1200-volt d. c. multiple-unit train service between the Key Route pier in San Francisco Bay and various parts of Oakland and the surrounding country. Its purpose is to afford a rapid commutation-suburban service rather than to meet purely urban needs. The pier extends three miles into the bay, and is connected with San Francisco by a ferry service, which covers the 2.85 miles in 14 minutes. Vestibule multiple-unit cars, 70 ft. long, are run in trains up to a length of eight cars. At 22d Street and Broadway, near the

OAKLAND TRAFFIC CONDITIONS AND CARS. The ferry slip is at the end of the three-mile Key Route Oakland pier and only 2.85 miles from San Francisco. Most Key Route interurban and local trains start here

center of Oakland, is a large interurban passenger station. Smaller stations and waiting-rooms, like that in the illustration on page 133, are located in various parts of the city. The operation of Key Route local trains over the Oakland city lines effectually adds to the value of the street railway in affording quick transit to distant points.

The street railway follows the general idea of the radial plan. The fact that so many closely-related communities must be served prevents the adoption of a purely radial system; but the map indicates clearly the extent to which the business center of Oakland has become the objective point of the majority of lines. From its inception the system has been extended with the view toward providing transit facilities not only where they were most needed, but to make each line serve the greatest possible amount of territory without re-routing of cars, and place every street in all the cities within reasonable distance of through car lines. The routes and cars are all arranged for double-end operation, but loops are used instead of switches wherever possible.

The generally warm and sunny weather that is enjoyed almost the entire year creates a large public demand for summer cars. The use of many cars having both open and closed sections consequently tends to accelerate car movement. In the business portion of Oakland, where most of the city traffic converges, car movements are naturally far heavier than in other districts, and while pedestrian and vehicular traffic is also very heavy, the width of the streets prevents what might otherwise be points of great congestion. Twelfth and 14th Streets bear the heaviest east and west traffic; Broadway the north and south. The corner of Broadway, San Pablo Avenue and 14th Street, shown in the engraving on page 132, is the heaviest traffic point on the system. Broadway and 12th Street, as well as other crossings in that vicinity, presents a situation that is practically as busy. During the rush hours, from 6.30 to 9.30 a.m. and 4.00 to 7.00 p.m., 250 cars per hour

OAKLAND TRAFFIC CONDITIONS AND CARS. These multiple-unit trains operate between parts of Oakland and neighboring cities and Oakland pier over the city lines. See illustration on page 134

pass these points, or at the rate of one car every $14^{2}/_{5}$ seconds. Under normal daily conditions 275 city cars are in service, but in addition to these there are several Key Route cars, of which 90 are in daily operation. Three hundred eight city and 100 Key Route cars are available on occasions of unusually great demand.

The Oakland city lines cover 213.18 miles of standard-gage track. In the outlying districts very severe grades are encountered, among which the steepest is 14 per cent. The radius of the shortest curve is 55 ft. During 1912 the operation of the system developed 16,530,975 car miles, and up to June 30th of that year 75,560,740 revenue and 20,627,638 transfer passengers were carried, showing the traffic density to have been 4.51 revenue passengers per car mile.

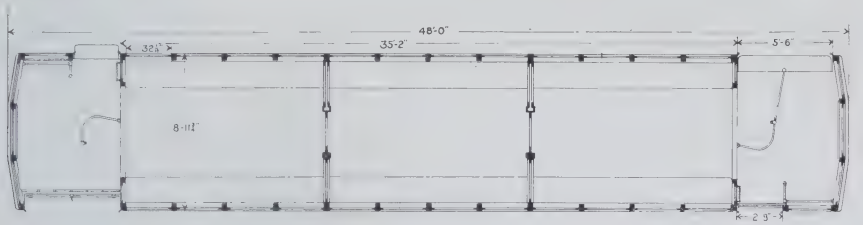
The prepayment system of fare collection is used on all closed cars, and while a great many California type cars are in service, the standard city cars are closed and are divided into three compartments, as shown in the illustrations and diagram on pages 138 and 139. These cars are a modified form of California type, in that the end compartments are generally kept open by having the window sashes dropped.

OAKLAND TRAFFIC CONDITIONS AND CARS. Arch-roof and monitor deck prepayment cars are San Francisco-Oakland Terminal Railway's new standard for city use. Brill No. 39-E single-motor trucks. "California" type is being slowly replaced

They are particularly adapted for use in California, where a great many people prefer to ride in an open car, but some like a little more protection than an open car affords. There is nothing unusual in the carbody except the bulkheads divid-

OAKLAND TRAFFIC CONDITIONS AND CARS. Standard car has steel bottomframe and steel sheathing to belt rail. Pantagraph gates and folding steps remain open on one side and closed on other till destination is reached. Modified "California" type; sashes usually dropped in end compartments and those in center usually remain up

ing it into the three compartments and the use of longitudinal seats in so long a body—35 ft. 2 in.. The platforms are rather long and exceptionally wide—only a few inches narrower than the body. The platform area and the width of the step opening are also increased by the fact that there is hardly any curvature in the vestibules. This is very unusual and is made possible, probably, by having a 55-ft. radius in the shortest curve. Both platforms are exactly alike, having the usual prepayment railing, with the end reaching the door post arranged to fold down when the particular platform is the front



OAKLAND TRAFFIC CONDITIONS AND CARS. Division into three compartments produces modified "California" type. Large platforms and wide steps possible with 55 ft. radius in shortest curve.

end. Like in many other prepayment cars, the exit side of the platform has a 2 ft. 8-in. opening. Folding steps and pantagraph gates are used at all openings. These are not operated while the car is on the road, but those on the right side remain open, while the others remain shut. The cars have steel bottomframes and steel side panels below the belt. They are mounted on Brill No. 39-E single motor trucks. A rather interesting feature, applying to all cars, is the use of guards over the trucks and along the carbody. The illustrations show this very cleary.

In addition to the standard cars, of which 60 are now in use, there is a variety of other types for passenger service, but they are slowly being replaced by the former. For special service, sight-seeing and mail cars are used. The large number of strangers always found in Oakland has been the cause for developing this service extensively. Freight and wrecking cars are also operated.

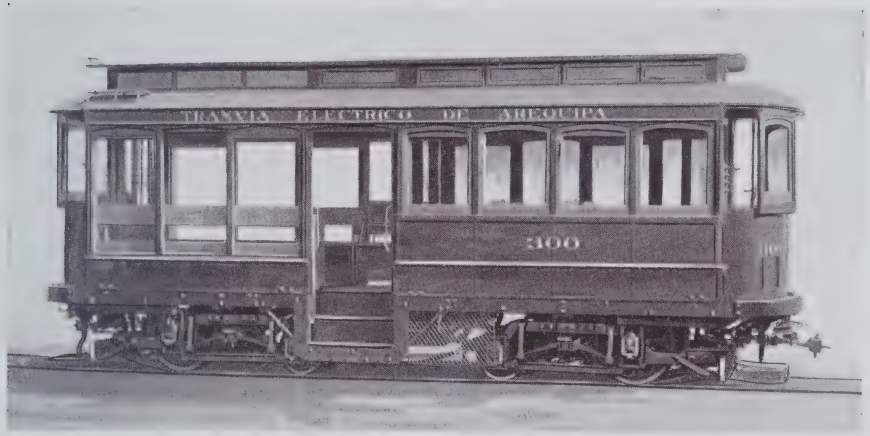
INTERESTING ROLLING STOCK FOR NEW PERUVIAN ELECTRIC ROAD

INITIAL EQUIPMENT

TRANVIA Electrico de Arequipa, a new electric railroad in the Peruvian city of that name, purchased 17 cars of the widely varying types shown on the following pages, from The J. G. Brill Company a short time ago. Such diversity of design as the new cars present, and for a city of but 40,000 inhabitants, led us to inquire into the conditions that influenced their choice.

Arequipa lies 7753 ft. above sea-level in an Andean valley in the southern part of Peru. It is about 107 miles from Molindo, its Pacific coast port, and on the direct rail line to Lake Titicaca, which, at an elevation of 12,900 ft., is the highest lake in the world. The city is completely encircled by lofty mountains, two of which, on the northwest—Mt. Charchani, 19,500, and the Misti Volcano, 20,320 ft. high—are among the tallest in South America. The valley in which the city lies is about ten miles long and five miles wide and is watered by the Rio Chile. It is generally fertile and produces an abundant supply of cereals and vegetables common to both hot and temperate regions. Peculiarly, the mountains and valleys beyond are virtual deserts, but are rich in mineral ores and borax deposits. Arequipa's chief trade is in the latter commodity, Bolivian mineral ores and alpaca wool and the products of neighboring Peruvian provinces.

The streets follow the rectangular plan, which is found in many South American cities. Owing to the proximity of active volcanoes and the frequent recurrence of more or less violent earthquakes, the buildings are low and have thick walls and domed roofs, as such structures appear best able to withstand the very heavy shocks. The fact that the



CARS FOR AREQUIPA. Separate side sills under each compartment. Angles passing under steps extend full length of car. Bulkheads at ends "V" shaped to form cabs. Open second-class compartment has removable seats

city is built on a long slope produces a peculiar condition that requires cars moving in one direction to negotiate an almost continuous up-grade averaging about 4½ per cent. This condition exists over the entire 8.2 miles of road. The city lines are 7.1 miles long—all single track except for a stretch of 1¼ miles of double track; a branch line, 2.38 miles long, runs to Tingo, a small suburb.

A rather novel reason is advanced for the use of separate

CARS FOR AREQUIPA. Structurally this car is identical with other center-entrance car, except that second-class compartment is closed. Brill No. 62-E single-motor trucks under both types

second-class compartments, and applies equally well to all the passenger car types. We quote from a letter sent the purchaser in New York by one of the engineers in the field, "It is advisable that second-class compartments be furnished, so that any smells brought aboard by the second-class passengers and their belongings can be segregated from the first-class riders."

CARS FOR AREQUIPA. Drop sashes. First-class compartment seats 14 passengers; second-class, 10; portable platform seat, 2; total, 26. Other center-entrance car seats 28

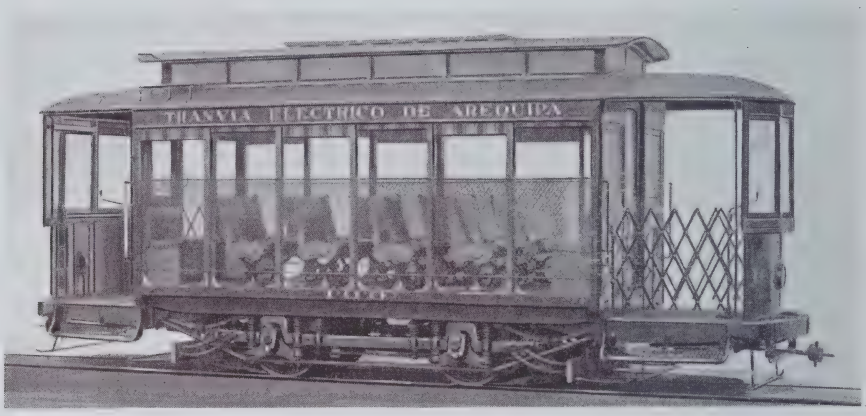
Of the seven types of cars The J. G. Brill Company built for Arequipa, those of the center-entrance variety are probably the most interesting. The necessity for first and second-class accommodations required either distinct short units for each class, or larger units providing both. The center entrance plan was adopted for three of the cars because it offered: first, a carbody suitable for both classes, with an effective barrier between them; secondly, a greater commercially useful space between the car ends; thirdly, a consequent increase in seating

capacity over a car of equal over-all length, but having end platforms; and fourthly, longer truck-centers because of the absence of drop platforms at the ends, with the result of easier riding qualities and reduced track wear.

Two varieties of center-entrance cars were built, distinct as regards body arrangement, but practically identical from a structural standpoint. Two have a first-class closed compartment with cross and longitudinal seats and single drop sashes and an open second-class compartment with removable longitudinal seats; the other has both first and second-class closed compartments, equipped with cross and longitudinal seats and drop sashes. Aside from these points the cars differ very little.

The platforms are reached by triple-tread steam-coach steps at the center-entrance and are arranged with a portable longitudinal seat, for two passengers, that may be carried on either side, depending on the direction in which the car moves. The conductor is stationed at this point, and separates first and second-class passengers. To best illustrate the manner in which the two compartments were given maximum length: the center platform is 3 ft. long; the end body-bulkheads are "V" shaped, with the apex pointing toward the center of the car to a depth of 2 ft. from the vestibules, forming motorman's cabs; the amount of space, therefore, not available for carrying seated passengers is but 4 ft., and as only two seats are lost at the center platform, half its length, or 1½ ft., should be added. The total non-revenue length is, consequently, 5½ ft., which is equivalent to two end platforms, each 2 ft. 9 in. long, indicating a saving of 1 ft. 11½ in., or two additional passengers, at each end of the car. The seating capacity of the car with the open second-class compartment is 28, and that of the other center-entrance car, 26.

The design of the bottomframe, though not extraordinary in the main, is interesting because of the unusual center-entrance step arrangement. The side sills are 3¾ by 6¾-in. yellow pine, in separate lengths under each compartment, and



CARS FOR AREQUIPA. Arranged exactly like any closed car of similar size. Brill portable vestibules used because of dry and rainy seasons. Capacity for 24 passengers on Brill "Winner" and stationary corner seats. Brill No. 21-E truck

are covered with $\frac{5}{8}$ by 7-in. steel plate along their inner surfaces. A $3\frac{1}{2}$ by 6 by $\frac{3}{8}$-in. angle extends through from bumper to bumper along the side sills and is depressed $21\frac{1}{8}$ in., forming the support for the lowest step-tread, as may be seen in the engravings on page 141. To prevent any sagging under the entrance, a heavy forged strap, each end of which is riveted to the end sill angles about 2 ft. from the sides of the

CARS FOR AREQUIPA. Second-class closed cars follow standard practice for 16-ft. bodies. Sweep of posts is 8 in. Brill No. 21-E truck

platform, is passed under and riveted to the depressed angle, like a short undertruss. The added extra strength is obvious. Otherwise, the bottom-frames follow standard practice more or less closely: there are no center stringers; the crossings are 2½ by 2½-in., except those under the bulkheads at the center platform, which, like the endsills, are 3¾ by 6-in. white oak.

CARS FOR AREQUIPA. Note simple ash finish for second-class service. Sashes drop. Seating capacity, 24

The center-entrance cars are mounted on Brill No. 62-E single-motor trucks.

The other cars in the order were seven center-aisle open, four second-class closed cars, one 2480-gal. Brill centrifugal sprinkler, a 24 ft. 6 in. meat car, and a 21 ft. gondola, all mounted on Brill No. 21-E trucks with wide-wing journal boxes.

The center-aisle open car follows standard practice throughout. It has the usual wood bottomframe used under single-

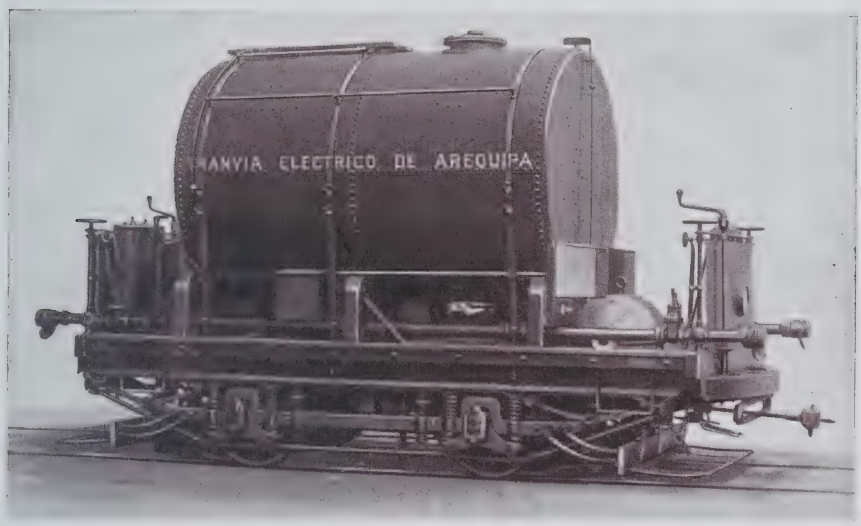
truck cars of 16-ft. body length. The platforms are of the open dasher type with pantagraph gates, and have Brill portable vestibules. Seats are provided for 24 passengers on eight Brill "Winner" and four stationary corner cross seats. The sides, which are straight, are entirely open, but are protected by wire-mesh side-guards, extending slightly higher than the seat backs.

The other single-truck passenger car, illustrated on pages 144 and 145, is closed and was designed for second-class service. It also follows standard practice and is structurally much like the center-aisle open car, except that it has concave and convex side panels with a sweep of 8 in., instead of straight sides. It has portable vestibules and pantagraph gates. It is equipped with longitudinal seats for 24 passengers and its windows are fitted with single drop-sashes. The interior finish is ash, with the roof-boards showing in the ceiling.

The sprinkler is of the Brill standard centrifugal type, of 2480 gallons capacity, and is arranged for double-end operation. The entire sprinkling mechanism consists of a 20 hp. motor, direct-connected to a centrifugal pump, one end of which receives the water direct from the bottom of the tank through a pipe in which is a single gate valve. Another pipe, which is direct-connected to the pipes leading to the sprinkler-heads, and has a valve-controlled branch to the tank, is fixed to the discharge end of the pump. By placing the pump between the heads and the tank, discharge at uniform pressure is assured. Each sprinkler-head has individual control for determining the range of the expelled water, and may be set and maintained in any position without further attention, for the water supply may be instantly cut off from or introduced into the heads by individual gate valves in convenient reach of the operator. This assures a stream of constant range, however often the flow may be interrupted, without necessitating a readjustment of the orifices in the sprinkler heads. By simply reversing the direction of flow, through the opening of one valve and the

closing of another, the pump may be used to fill the tank.

The meat and gondola cars present no special features and are much like those that have been described in BRILL MAGAZINE from time to time. The meat car has open platforms and is designed for double-end service. The entire interior, including the floor, is lined with zinc. Galvanized rods and meat hooks



CARS FOR AREQUIPA. 2480-gallon Brill centrifugal sprinkler. Twenty hp. motor-pump between tank and sprinkler-heads assures uniform pressure; independent sprinkling-heads and gate valves. Pump fills tank when flow is reversed. Brill No. 21-E truck

for properly loading the car are arranged much as in meat shops. The gondola has extremely low sides—12 inches—and is chiefly for use in construction work. Open platforms are provided at each end, and in the middle is a standard to support the trolley base.

The following are the dimensions of the two types of center-entrance first and second-class cars, the only difference being in the seating capacity, as noted below:

Length over corner posts	26 ft. 0 in.	Width over posts	7 ft. 6 in.
Length of center platform	3 ft. 0 in.	Extreme width	7 ft. 9½ in.
Length of each end-cab	2 ft. 0 in.	From track to side sills	2 ft. 3⅞ in.
Centers of side posts	2 ft. 7⅛ in.	From side sills over trolley boards	8 ft. 6½ in.
Width over side sills	7 ft. 2½ in.		

From floor to underside of roof boards	7 ft. 6⅛ in.
Track to first step	13⅞ in.
First step to second step	10⅜ in.
Second step to platform	10⅜ in.
Platform to floor	1¾ in.
Seating capacity	26 and 28
Type of trucks	Brill No. 62-E
Wheel base	4 ft. 6 in.
Diameter of wheels	33 and 21 in.
Type of motors	GE58—2-37 hp.
Wt. of carbody less electrical equipment	6,800 lb.
Wt. of electrical equipment	1,560 lb.
Wt. of air-brake equipment	1,200 lb.
Weight of trucks	9,880 lb.
Weight of motors	4,300 lb.
Total weight	23,740 lb.

The dimensions of the 16 ft. center-aisle open cars are:

Length over corner posts	15 ft. 11¾ in.
Length over platforms	24 ft. 11¾ in.
Length of platforms	4 ft. 6 in.
Centers of side posts	2 ft. 7⅛ in.
Width over side sills	7 ft. 6¼ in.
Width over posts	7 ft. 6 in.
Extreme width	7 ft. 9¼ in.
From track to side sills	2 ft. 7 11/16 in.
From side sills over trolley boards	8 ft. 3¾ in.
From floor to center of ceiling	7 ft. 10¼ in.
Track to step	14½ in.
Step to platform	13 in.
Platform to floor	8 in.
Seating capacity	24
Type of trucks	Brill No. 21-E
Wheel base	6 ft. 6 in.
Diameter of wheels	33 in.
Size of journals	3¾ by 7 in.
Type of motors	GE58—2-37 hp.
Weight of carbody less electrical equipment	7,240 lb.
Wt. of electrical equipment	1,565 lb.
Weight of truck	5,720 lb.
Weight of motors	4,300 lb.
Total weight	18,825 lb

The dimensions of the 16 ft. second-class cars are:

Length over corner posts	16 ft. 0 in.
Length over platforms	25 ft. 0 in.
Length of platforms	4 ft. 6 in.
Centers of side posts	2 ft. 7⅛ in.
Width over side sills	6 ft. 2 in.
Width over posts	7 ft. 6 in.
Extreme width	7 ft. 9¼ in.
From track to side sills	2 ft. 4⅝ in.
From side sills over trolley boards	8 ft. 6 11/16 in.
From floor to underside of roof boards	7 ft. 9 11/16 in.
Track to step	14½ in.
Step to platform	13 in.
Platform to floor	8 in.
Seating capacity	24
Type of truck	Brill No. 21-E
Wheel base	6 ft. 6 in.
Diameter of wheels	33 in.
Size of journal	3¾ by 7 in.
Type of motors	GE58—2-37 hp.
Weight of carbody, less electrical equipment	6,225 lb.
Wt. of electrical equipment	1,000 lb.
Weight of truck	5,600 lb.
Weight of motors	4,300 lb.
Total weight	17,125 lb.

The dimensions of the 2480-gallon sprinkler are:

Length over platforms	17 ft. 0 in.
Length of front platform	3 ft. 0 in.
Length of rear platform	4 ft. 0 in.
Width over side sills	6 ft. 10 in.
Extreme width	7 ft. 1 in.
From track to floor	3 ft. 3¾ in.
Type of truck	Brill No. 21-E
Wheel base	6 ft. 6 in.
Diameter of wheels	33 in.
Size of journals	3¾ by 7 in.
Type of motors	GE58—2-37 h.p
Weight of carbody less air and electrical equipment	12,340 lb.
Wt. of electrical equipment	1,565 lb.
Wt. of air-brake equipment	900 lb.
Weight of truck	5,440 lb.
Weight of motors	4,300 lb.
Total weight	24,545 lb.

INTERESTING CARS FOR SYRACUSE & SUBURBAN RAILROAD

BRILL HIGH-SPEED TRUCKS

THE Syracuse & Suburban Railroad Company, which operates an interurban line in central New York, has recently increased its equipment with two double-end semi-convertible cars, built by The J. G. Brill Company. The main line of the road extends from a point near the New York Central & Hudson River Railroad station in Syracuse southeast to Edwards Falls, N. Y., a distance of 12 miles. It follows the highway the entire distance, passing through DeWitt, Fayetteville and Manlius en route. From Dewitt, 5⅛ miles from Syracuse, a three-mile branch runs in a southerly direction to Jamesville, N. Y. Two miles of this branch are on private right of way. When the road was constructed in 1897–8 the decision to follow the highway precluded the possibility of grading or straightening and resulted in an arduous alignment and profile, in which several extremely sharp curves, and grades as steep as 11 per cent, occur frequently. While such a physical condition increases the difficulty and cost of operation, it is offset by the fact that the highway route is populous, and the majority of the local villages cluster along the roadside, whereas it would have been necessary to develop the territory through which a graded line might have been built.

Syracuse, with a population of 137,249 in 1910, contributes most heavily to the system's traffic, especially because of the two miles of double-track main line in the heart of the city. Between Syracuse and Edwards Falls the traffic demand is attested by 64 local stopping points, or an average of over five per mile. All this traffic is handled over a single track with ten turnouts, or passing sidings, distributed between the two

points. Power for the operation of both the main line and branch is generated in a hydro-electric plant at Edwards Falls. and at Orville a rotary converter and three transformers are supplied with current by a generating company in emergencies.

The two new cars are mounted on Brill No. 27-M.C.B.-1 trucks, capable of a speed of 50 miles an hour, and have a wooden bottom frame in which the side sills are 4 by 7¾-in.

CARS FOR SYRACUSE AND SUBURBAN. Cars follow highway; 64 stops en route. Total mileage, 18.

yellow pine, reinforced their full length with ⅜ by 15-in. steel plate; end sills of 5¼ by 6⅞-in. oak, and crossings of 4½ by 5½-in. oak. Under the center of the car body, where the bottom frame is subject to brake-lever strains, 4½ by 2¾-in. oak diagonal braces provide both lateral and longitudinal reinforcement. An undertruss of 1⅛ in. diameter under each side sill reinforces the entire frame and preserves horizontal alignment.

The platforms, which are supported on oak knees, reinforced with 3 by 4 by ½-in. angles, are each 5 feet long, and have a step on the controller side only. They are enclosed and have three windows with drop sashes, and sliding doors manually operated by the conductor. In the body framing

CARS FOR SYRACUSE AND SUBURBAN. Platform openings on controller side only. Sliding doors manually operated by conductor. Brill No. 27-M.C.B.1 trucks

are 3⅝-in. ash corner posts and 2¾-in. side posts, 2 ft. 8 in. between centers and with a sweep of 1¾ in.

The interior is divided into two compartments, between which is a bulkhead with a sliding door 27 in. wide. The

CARS FOR SYRACUSE AND SUBURBAN. Smoking compartment seats 16 passengers on longitudinal seats: main compartment, two longitudinal corner seats, 4; Brill "Winner" reversible seats, 28; total, 48. Brill semi-convertible window system

smaller, or smoking, compartment occupies the length of four windows and has two rattan-covered longitudinal seats for 16 passengers. The main compartment is provided with 14 Brill "Winner" reversible transverse seats and two longitudinal seats at the end. The entire car has a seating capacity of 48 persons. Ventilation is secured through eight Brill "Exhaust" ventilators, placed in rows of four, in the plain-arch roof, and the windows are of the Brill semi-convertible type that disappear in roof pockets. The interior of the car is finished in mahogany inlaid with white holly.

Length over corner posts	34 ft. 4 in.	Seating capacity	48
Length over platforms	44 ft. 4 in.	Type of trucks	Brill No. 27-M.C.B.1
Length of platforms	5 ft. 0 in.	Wheel base	6 ft. 0 in.
Length of passenger comp.	22 ft. 6 in.	Diameter of wheels	34 in.
Length of smoking comp.	11 ft. 10 in.	Size of journals	3¾ x 7 in.
Centers of side posts	2 ft. 8 in.	Type of motors	GE88—4-40 hp.
Width over sills	8 ft. 0½ in.	Weight of carbody less electrical equipment	20,180 lb.
Width over posts	8 ft. 4 in.	Wt. of electrical equipment	2,000 lb.
From track to side sills	2 ft. 11¼ in.	Wt. of air-brake equipment	1,500 lb.
From rail over trolley board	12 ft. 1 in.	Weight of trucks	14,320 lb.
Track to step	18 7/16 in.	Weight of motors	12,000 lb.
Step to platform	15½ in.	Total weight	50,000 lb.
Platform to floor	8⅛ in.		

PREPAYMENT CARS FOR ST. THOMAS, ONTARIO

BRILL SEMI-CONVERTIBLE WINDOW SYSTEM

THE St. Thomas Municipal Railway, St. Thomas, Ontario, Canada, placed in service, about a month ago, three new double-truck prepayment cars, built by the G. C. Kuhlman Car Company. St. Thomas is in the southern part of the Province of Ontario, about half-way between Buffalo, N. Y., and Detroit, Mich., and is served by the Michigan Central, Wabash, Canadian Pacific, Grand Trunk and Pere Marquette Railroads. It has a population of 13,414, and owns and operates the street railway system.

CARS FOR ST. THOMAS. Steel bottomframe. Two-leaf folding entrance and swinging exit doors and single folding step at rear. Sliding exit door at forward end. Brill No. 39-E trucks

The new cars are mounted on Brill No. 39-E single-motor trucks, having solid forged side frames and pedestal jaws that are integral with the forgings. A steel bottom frame supports the upper structure, in which the ash corner posts are 3⅝ in. and side posts 3¼ in. thick. Eight exhaust ventilators are placed in the Brill plain-arch roof. The roof is supported on ash carlines, reinforced with concealed steel rafters.

There are two prepayment platforms, 6 ft. 6 in. long, separated from the body by bulkheads. Each bulkhead has two sliding doors, with a common central pocket. The cars are arranged for double-end operation, and, therefore, each platform has an entrance and two exits. The combined entrance and exit at the left of the motorman's position is divided by a door post, shown in the accompanying engraving; behind this is another post, reaching from the floor to the hood, and a pipe railing, fixed to this post, extends back to the conductor's position. The openings are fitted with a two-leaf folding entrance door and a swinging door for exit, both hinged to the door post. A folding step operates in conjunction with the entrance door and on the other side is a sliding exit door and synchronous folding step, operated by the motorman.

The cars are equipped with the Brill semi-convertible window system, in which both sashes, when raised, disappear

CARS FOR ST. THOMAS. Cross seats, 20; longitudinal corner seats, 8; total, 28
Brill semi-convertible window system

in roof pockets. The seating arrangement provides for 28 passengers, of whom 20 occupy Brill "Winner" reversible seats, and eight, longitudinal corner seats. The roofs are ceiled with three-ply birch veneer and the sides and bulkheads are cherry, rubbed to a smooth, dull finish. Push buttons are provided for signaling motorman and conductor. Sand boxes, alarm gongs, signal bells and other accessories are of the builder's manufacture.

Length over corner posts	25 ft. 4 in.	From floor to center of headlining	7 ft. 10¼ in.
Length over platforms	38 ft. 4 in.	Step to platform	14½ in.
Length of platforms	6 ft. 6 in.	Platform to floor	9⅜ in.
Centers of side posts	2 ft. 8 in.	Seating capacity	28
Width over sills	8 ft. 6 in.	Type of trucks	Brill No. 39-E
Width over posts	8 ft. 6¾ in.	Wheel base	4 ft. 6 in.
Extreme width	8 ft. 8¾ in.	Diameter of wheels	33 and 21 in.
From track to side sills	2 ft. 8⅜ in.	Wt. of carbody, less elec. equip.	27,380 lb.
From side sills over trolley boards	8 ft. 11⅝ in.	Weight of trucks	9,560 lb.
Track to step	15 7/16 in.		

THE NEW PITTSBURGH AUTOBUS LINE

BRILL BODIES

THE Pittsburgh Auto Transit Company was organized for the purpose of supplementing existing street railway lines and providing a frequent, fast and comfortable means of automobile transportation through a high-class residential district. Eight large single-deck omnibuses with Brill-built bodies, mounted on White chassis, were placed in the new service, which will probably be extended into other parts of Pittsburgh. The machines run from the City Hall, past the Union Station, along the Grand Boulevard section to Highland Park. The route is about six miles long. Near Highland Park, the east end of the route, the east and westbound lines separate, passing through a well-developed business section.

The route selected is ideal for autobus operation; the streets are wide and well paved and are used almost exclusively by pleasure motor cars; it passes through a populous district that promises ample traffic, even with the very large vehicles that

AUTOBUSES FOR PITTSBURGH. These are the longest and widest closed bus-bodies ever built. Note supporting angles under chassis for extra strength. Show extent to which one man can handle large seating capacity and difficult operation on heavy traffic streets

are operated. Furthermore, the route is almost a mile shorter than competing electric lines, and with the type of automobile that is used, a fast and regular schedule can be maintained.

The new omnibuses are noteworthy in several respects: they have an unusually large seating capacity for a single-deck vehicle—34 persons—which is equal to that of the standard double-deck machines used in London, England; they have longer and wider bodies than any that we have ever built and are operated on the one-man prepayment principle. The latter point is especially interesting because it demonstrates the extent to which one man can control both car and passengers in a heavy-traffic zone, with a seating capacity greater than that of a single-truck electric car, and operating methods requiring not only greater attention, but more skill and a higher degree of mentality.

AUTOBUSES FOR PITTSBURGH. Passengers alight before others board, to prevent confusion. Chauffeur controls two-leaf folding doors and collects fares. Narrow window at right, with stationary sashes, preserves uniform side post centers on both sides

The doorway, which is clearly shown on this page, is used for both entrance and exit. The chauffeur's seat is directly opposite, giving him a clear view ahead and to both sides. The

lever by which he controls the double-leaf folding door is in convenient reach of his left hand. A wood partition, with a pipe stanchion extending to the roof, is placed next to the doorway to prevent interference between passengers in the longitudinal seat on that side and those boarding or alighting. A stationary cross seat is backed against that occupied by the chauffeur; the remaining seats are also of the stationary transverse type. An emergency exit is placed in the rear end, and when closed is covered by a portable seat. The windows, which are arranged in the same manner as in the light-weight cars built for Meridian, Miss., Waco, Tex., Muskogee, Okla., Missoula, Mont., and other cities by the American Car Company, have an interesting feature in the stationary upper sashes set in a single frame that extends from end to end; the reinforcement so given

AUTOBUSES FOR PITTSBURGH. Small panel and stanchion at right hand longitudinal seat prevents interference between seated passengers and those boarding and alighting. Note chauffeur's clear outlook. Passengers signal for stops by push-buttons

the body structure is obvious. The lower sashes are made to raise their full height. The bottomframing is much the same as in other buses built by this company, with the crossings as the principal carrying members. Owing to the great length and width of the body, however, it was found necessary to add materially to this construction. Consequently, heavy forged angles were bolted to the undersides of the chassis frames and attached to the side sills. These are readily seen in the illustration on page 155. The body framing follows light-weight street car practice very closely, having 3½-in. corner and 1⅝-in. ash side posts, with a sweep of 2½ in.

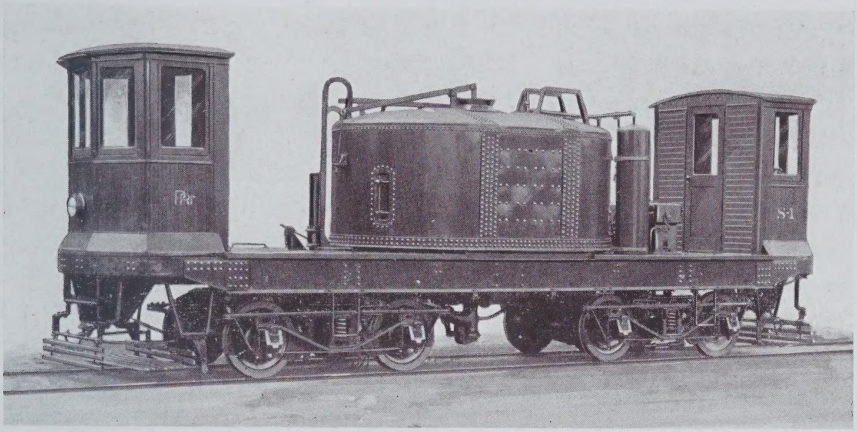
Reference to the illustration on page 155 will also show how the bottomframe was made to suit the rear wheels, without interfering with the interior body arrangement, making it possible, also, to remove or retire these wheels, without having to raise the body from the chassis.

The following are the principal dimensions:

Length of body	23 ft. 0½ in.	Street to first step	14 in.
Centers of side posts	2 ft. 4½ in.	First to second step	11 in.
Width over sills	7 ft. 7 in.	Second step to floor	11 in.
Width over posts (rear)	8 ft. 0 in.	Seating capacity	34
Width over posts (front)	7 ft. 0 in.	Type of chassis	White 5-ton
Extreme width	8 ft. 2¼ in.	Wheel base	19 ft. 1 in.
From pavement to side sills	2 ft. 9 in.	Diameter of wheels: front	36 in.; rear 40 in.
From side sills over roof	7 ft. 5 in.	Weight of chassis	8,500 lb.
From floor to center of headlining	6 ft. 10½ in.	Weight of body	5,100 lb.
		Total weight	13,600 lb.

UNUSUAL AIR-CONTROLLED SAND CARS FOR PHILADELPHIA

FOR the better, quicker and cheaper distribution of dry sand among the 17 car barns on the extensive lines of the Philadelphia Rapid Transit Company, two extremely interesting and ingenious sand cars were recently built for that system by the J. G. Brill Company. The purpose of the car is not to replace existing sanding devices on regular passenger



SAND CAR FOR PHILADELPHIA. For distributing sand among car barns quickly; not for track sanding. Tank filled at top by gravity; emptied from hopper below or 4-in. standpipe above car floor by 60-lb. air pressure. Brill No. 50-E truck; see BRILL MAGAZINE, December, 1912, for description of truck

equipment, for it has no track sander, other than that necessary to insure its own traction; its function is merely to transport dry sand quickly between any points on the lines, for future consumption.

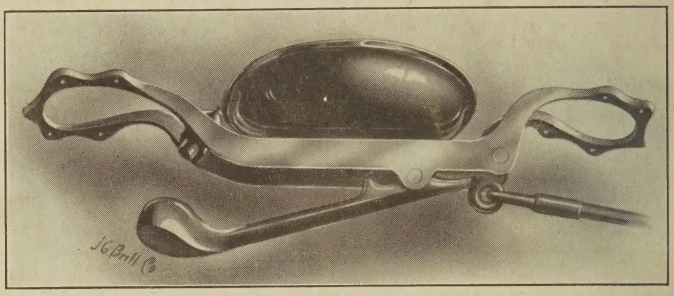
The car consists, chiefly, of a heavy steel bottomframe, mounted on Brill No. 50-E arch-bar trucks, and a double-riveted conical-bottom tank, as may be seen in the engraving on this page. The discharge of sand from the tank is effected by a simple method of uniform air pressure, and loading is done by gravity.

From a central depository, sand is poured into the tank through the large, domed opening at the top. A valve, 19 in. in diameter, like an inverted poppet valve on an automobile engine, controls the opening, and permits the sand to rise to within 5 in. of the top of the tank. A motor with a centrifugal pressure blower, having a capacity of 50 cu. ft. of free air per minute—enough for both the sand and air-brake requirements—charges two 16 by 60-in. auxiliary tanks to 60 lbs. per square inch. The tops of the two tanks are piped to a central supply pipe that has two sand connections: one to the top of the sand tank, where its supply is governed by a pop safety

valve set for 60 lbs.; the other leads down to the cast-steel hopper underneath the tank. The line from each air tank to the central supply pipe, and the pipe leading to the hopper casting underneath, are controlled by individual quick-acting gate valves. Opposite the point in the hopper where the pipe from the air tanks is tapped into it, a 4-in. pipe is flanged, and passes through the floor of the car, projecting up 3 ft. This is clearly shown in the engraving. When the car reaches a receiving station, and can unload over a pit, the valve in the air pipe leading to the hopper is closed, and that leading to the tank opened, permitting the air pressure in the sand tank to force the material through; if a pit is not at hand, a hose is coupled to the pipe passing through the car floor, and by opening the valve leading to the hopper and keeping the hopper closed, the pressure in the tank forces the sand down, and the air entering the hopper through the small pipe blows it through the long delivery pipe, much like an injector on a steam boiler, so that it may be placed where convenient.

The bottomframe is built of commercial steel shapes; the side sills are 15-in. I-beams; the 15-in. cross channels form the ends of the open space for the tank. Eight-inch channel end-sills, channel bumpers of the same dimensions and minor pieces, complete the structure. The tank is secured to the bottomframe by 4⅛-in. Z-bars, riveted to the side sills. Each end has a motorman's cab containing the usual operating apparatus. The Brill No. 50-E arch-bar trucks on which the cars are mounted were fully described in an article in the December, 1912, issue of BRILL MAGAZINE.

Length over bumpers	34 ft. 0 in.	Wheel base	6 ft. 0 in.
Length over platforms and cabs	33 ft. 2 in.	Diameter of wheels	33 in.
Length of each cab	4 ft. 0 in.	Size of journal	4¼ in. by 8 in.
Width over sills	8 ft. 4¼ in.	Type of motors	GE210—2-70hp.
Width of cab	7 ft. 6¼ in.	Weight of car body less elec. equipment	20,320 lb.
From track to side sills	3 ft. 2 in.	Weight of elec. equipment	1,240 lb.
From floor over cab roof	7 ft. 1⅞ in.	Wt. of air-brake equipment	600 lb.
Track to stirrup step	19 in.	Weight of trucks	15,880 lb.
Step to floor	34 in.	Wt. of motors	6,760 lb.
Type of trucks	Brill 50-E 2	Total weight	44,800 lb.



THE BRILL RETRIEVER SIGNAL BELL

Ding! Ding! You've heard that ring hundreds of times. Think whether each ding comes from a gentle pull or a heavy jerk? When the conductor's busy watching passengers getting on or off, closing doors, or collecting fares in the car, he hasn't time to mentally calculate the pounds of pull to put on that cord; he needs a bell that will ring with the slightest pull—and then, only one loud, clear ring with each pull—but it must be positive! And to be positive the cord must be instantly retrieved after each pull. It takes, first, good stuff in the bell, and then, a long clapper with a heavy head, able to retrieve the cord and hit the bell hard—then it takes a simple cam arrangement to operate it, so that the pull starts with a small leverage and instantly jumps to a large one. If you've seen a bell act and look like that, it was a Brill Retriever Signal Bell.

THE J. G. BRILL COMPANY
PHILADELPHIA, PENNSYLVANIA